RUMUS MATEMATIK
MATHEMATICAL FORMULAE

Rumus-rumus berikut boleh membantu anda untuk menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.
The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used

NOMBOR DAN OPERASI
NUMBERS AND OPERATIONS

1 $a^m \times a^n = a^{m+n}$

2 $a^m \div a^n = a^{m-n}$

3 $(a^m)^n = a^{mn}$

4 $a^{\frac{m}{n}} = (a^m)^{\frac{1}{n}}$

5 Faedah mudah / *Simple interest*, $I = Prt$

6 Nilai matang/$Maturity\ value, MV = P\left(1+\frac{r}{n}\right)^{nt}$

7 Jumlah bayaran balik / *Total repayment*, $A = P + Prt$

PERKAITAN
RELATIONS

1 Jarak / *Distance* = $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Titik Tengah / *midpoint*

2 $(x, y) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

3 Purata laju = $\frac{\text{jarak yang dilalui}}{\text{masa yang diambil}}$

Average speed = $\frac{distance\ travelled}{time\ taken}$

4 $m = \frac{y_2-y_1}{x_2-x_1}$

5 $m = -\frac{\text{pintasan-}y}{\text{pintasan-}x}$

$m = -\frac{y\text{-intercept}}{x\text{-intercept}}$

6 $A^{-1} = \frac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

SUKATAN DAN GEOMETRI
MEASUREMENT AND GEOMETRY

1 Teorem Pythagoras / *Pythagoras Theorem* $c^2 = a^2 + b^2$

2 Hasil tambah sudut pedalaman poligon / *Sum of interior angles of a polygon*
$= (n - 2) \times 180^o$

3 Lilitan bulatan $= \pi d = 2\pi j$
Circumference of circle $= \pi d = 2\pi r$

4 Luas bulatan $= \pi j^2$
Area of circle $= \pi r^2$

5 $$\frac{\text{Panjang lengkok}}{2\pi j} = \frac{\theta}{360°}$$
$$\frac{\text{Arc length}}{2\pi r} = \frac{\theta}{360°}$$

6 $$\frac{\text{Luas sektor}}{\pi j^2} = \frac{\theta}{360°}$$
$$\frac{\textit{Area of sector}}{\pi r^2} = \frac{\theta}{360°}$$

7 Luas lelayang $= \frac{1}{2} \times$ hasil darab panjang dua pepenjuru

$\textit{Area of kite} = \frac{1}{2} \times \textit{product of two diagonals}$

8 Luas trapezium $= \frac{1}{2} \times$ hasil tambah dua sisi selari $\times$ tinggi

Area of trapezium $= \frac{1}{2} \times$ *sum of parallel sides* $\times$ *height*

9 Luas permukaan silinder $= 2\pi j^2 + 2\pi jt$
Surface area of cylinder $= 2\pi r^2 + 2\pi rh$

10 Luas permukaan kon $= \pi j^2 + \pi js$
Surface area of cone $= \pi r^2 + \pi rs$

11 Luas permukaan sfera $= 4\pi j^2$
Surface area of sphere $= 4\pi r^2$

12 Isipadu prisma tegak = luas keratan rentas $\times$ tinggi
Volume of right prism = cross sectional area $\times$ *height*

13 Isipadu silinder $= \pi j^2 t$
Volume of cylinder $= \pi r^2 h$

14 Isipadu kon $= \frac{1}{3}\pi j^2 t$

Volume of cone $= \frac{1}{3}\pi r^2 h$

15 Isipadu sfera = $\frac{4}{3}\pi j^3$

Volume of sphere = $\frac{4}{3}\pi r^3$

16 Isipadu piramid tegak = $\frac{1}{3}$ × luas tapak × tinggi

Volume of right pyramid = $\frac{1}{3}$ × *base area* × *height*

17 Faktor skala, $k = \frac{PA'}{PA}$

Scale factor, $k = \frac{PA'}{PA}$

18 Luas imej = k^2 × luas objek

Area of image = k^2 × *area of object*

STATISTIK DAN KEBARANGKALIAN
STATISTICS AND PROBABILITY

1 Min / $Mean, \bar{x} = \frac{\sum x}{N}$

2 Min / $Mean, \bar{x} = \frac{\sum fx}{f}$

3 Varians / $Variance, \sigma^2 = \frac{\sum (x-\bar{x})^2}{N} = \frac{\sum x^2}{N} - \bar{x}^2$

4 Varians / $Variance, \sigma^2 = \frac{\sum f(x-\bar{x})^2}{f} = \frac{\sum fx^2}{f} - \bar{x}^2$

5 Sisihan piawai / $Standard\ deviation, \sigma = \sqrt{\frac{\sum (x-\bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$

6 Sisihan piawai / $Standard\ deviation, \sigma = \sqrt{\frac{\sum f(x-\bar{x})^2}{f}} = \sqrt{\frac{\sum fx^2}{f} - \bar{x}^2}$

7 $P(A) = \frac{n(A)}{n(S)}$

8 $P(A') = 1 - P(A)$

1. Given linear equations $h - 9 = -21$. Determine value of h.
Diberi persamaan linear $h - 9 = -21$. *Tentukan nilai* h.

A -30
B -12
C 12
D 30

2. The solution for $\frac{h}{4} - 1 \geq h + 5$ is
Penyelesaian bagi $\frac{h}{4} - 1 \geq h + 5$ *ialah*

A $h \geq -8$
B $h \geq 8$
C $h \leq -8$
D $h \leq 8$

3. In Diagram 1, BG is a straight line.
Dalam Rajah 1, BG ialah suatu garis lurus.

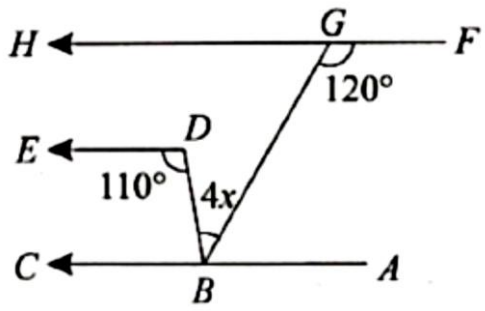


Diagram 1 / *Rajah 1*

Find the value of x.
Cari nilai x.

A 8.5
B 10.5
C 12.5
D 14.5

4. Factorise completely $5x^2 - 80$.
Faktorkan selengkapnya $5x^2 - 80$.

A $5(x + 4)(x - 4)$
B $5(x + 4)^2$
C $5(x - 4)^2$
D $(x + 4)(x - 4)$

5. $6(2t - 7) - (10 - 6t)^2 =$

A $-142 + 132t - 36t^2$
B $100 + 132t - 36t^2$
C $-142 + 12t + 36t^2$
D $100 + 12t + 36t^2$

6. Given that $m = \frac{3}{7} + \frac{n}{7}$, express n in terms of m.
Diberi bahawa $m = \frac{3}{7} + \frac{n}{7}$ *, ungkapkan n dalam sebutan m.*

A $n = \dfrac{49m - 3}{7}$
B $n = \dfrac{3 - 49m}{7}$
C $n = 3 - 7m$
D $n = 7m - 3$

7. In Diagram 2, $PQRSTU$ is a regular hexagon. RPW and RUV are straight lines.
Dalam Rajah 2, $PQRSTU$ *ialah heksagon sekata.* RPW *dan* RUV *ialah garis lurus.*

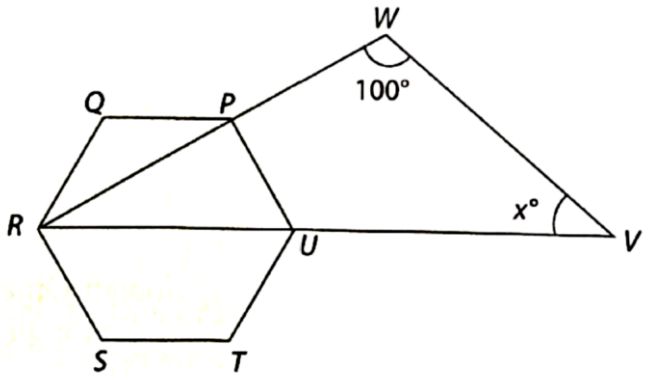


Diagram 2 / *Rajah 2*

Find the value of x.
Cari nilai x*.*

A 20
B 30
C 40
D 50

8. Point M with coordinates $(3, 4)$ is the midpoint of the line AB and A has the point $(-1, 6)$. What is the point of B?
Titik M *dengan koordinat* $(3, 4)$ *adalah titik tengah bagi garis* AB *dan* A *mempunyai koordinat* $(-1, 6)$*. Apakah koordinat titik* B*?*

A $(1, 5)$
B $(7, 2)$
C $(2, 10)$
D $(1, 2)$

9. Which set of ordered pairs is not a function?
Antara berikut, set manakah bukan sebuah fungsi?

A (1, 3), (2, 7), (3, 8), (4, 11)
B (1, 2), (3, 5), (6, 9), (7, 11)
C (2, 3), (4, 9), (3, 8), (4, 15)
D (-9, 4), (-6, 3), (-2, 8), (0, 21)

10. Diagram 3 shows a straight line PQ with equation $y = 2x + 6$. QR is parallel to the x-axis and its distance is 9 unit.
Rajah 3 menunjukkan garis lurus PQ yang mempunyai persamaan $y = 2x + 6$. QR adalah selari dengan paksi-x dan jaraknya ialah 9 unit.

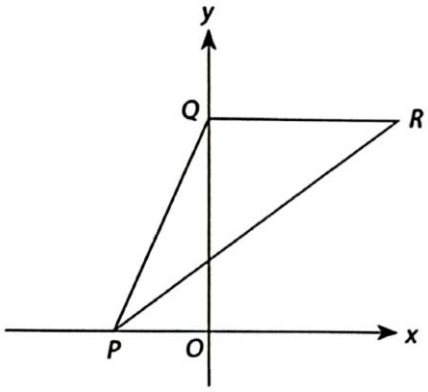


Diagram 3 / *Rajah 3*

Find the gradient of PR.
Cari kecerunan PR.

A $\frac{3}{4}$
B $\frac{4}{3}$
C $\frac{1}{2}$
D 2

11. Diagram 4 shows a triangle ABC drawn on a Cartesian plane.
Rajah 4 menunjukkan sebuah segi tiga ABC yang dilukis pada satah Cartes.

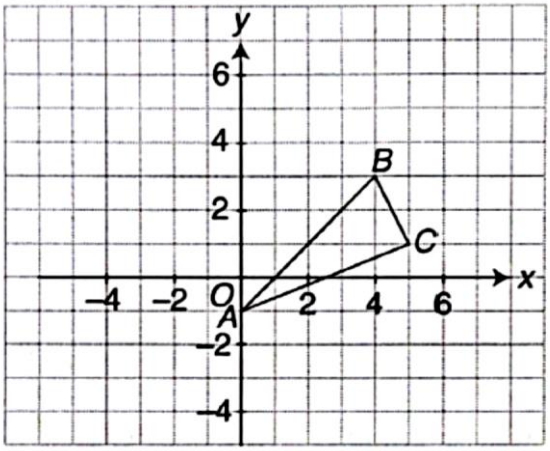


Diagram 4 / *Rajah 4*

Determine the coordinates of the image of point C under a reflection in the line AB.
Tentukan koordinat imej bagi titik C di bawah satu pantulan pada garis AB.

A (2 ,3)
B (2 ,4)
C (3 ,4)
D (1 ,5)

12. Table 1 is a cumulative frequency table which shows the mark of 30 pupils in a Mathematics quiz.
Jadual 1 ialah jadual kekerapan longgokan yang menunjukkan markah bagi 30 orang murid dalam suatu kuiz Matematik.

Markah *Marks*	0	1	2	3	4	5
Kekerapan longgokan *Cumulative frequency*	2	6	13	22	27	30

Table 1 / *Jadual 1*

Find the mode of the data.
Cari mod bagi data tersebut.

A 6
B 5
C 4
D 3

13. 40 coupons with serial numbers 11 to 50 are put in the box. One coupon is drawn at random. The probability of drawing a coupon with a number which is **not** a multiple of 5 is
*40 keping kupon dengan nombor siri 11 hingga 50 diletak dalam sebuah kotak. Sekeping kupon dicabut secara rawak. Kebarangkalian kupon yang dicabut dengan nombor siri **bukan** gandaan 5 ialah*

A $\frac{1}{5}$
B $\frac{4}{5}$
C $\frac{7}{24}$
D $\frac{9}{24}$

14. Simplify / *Ringkaskan* $2(m^{\frac{2}{3}}n^{-1})^{-3} \times \frac{m^{-3}}{n^2}$
A $\frac{2n}{m^5}$
B $\frac{8n}{m^5}$
C $\frac{2m^6}{n^6}$
D $\frac{8m^6}{n^6}$

15. Round off 0.007105 correct to two significant figures.
Bundarkan 0.007105 betul kepada dua angka bererti.
A 0.01
B 0.0071
C 0.00710
D 0.00711

16. $1.6 \times 10^5 + 66\ 000 =$

A 2.26×10^5
B 2.26×10^9
C 7.20×10^5
D 7.20×10^9

17. The area of a rectangular land is 9.6 km^2. Its length is 4 000m. The width, in m, of the land is
Luas sebuah tanah yang berbentuk segi empat tepat ialah 9.6 km^2. Panjang tanah itu 4 000m. Lebar, dalam m, tanah itu ialah

A 2.4×10^3
B 3.0×10^3
C 4.8×10^3
D 9.6×10^3

18. Bank Bumi offers an interest rate of 5 % per annum and is compounded every 3 months for savings in fixed deposit accounts. What is the minimum principal amount of money to be deposited at the beginning of the year in a fixed deposit account so that Miss Anis can earn more than RM10 000 of savings at the end of the fifth year?
Bank Bumi menawarkan kadar faedah 5 % setahun dan dikompaunkan setiap 3 bulan sekali untuk simpanan dalam akaun simpanan tetap. Berapakah jumlah wang principal minimum yang perlu disimpan pada awal tahun dalam akaun simpanan tetap supaya Cik Anis boleh mendapat melebihi RM10 000 wang simpanan pada akhir tahun kelima?

A RM7 000
B RM7 601
C RM7 800
D RM7 801

19. Reuben bought 3 500 shares at RM1.78 a share and 5 500 shares at RM2.92 a share. Calculate the average cost for one unit of share.
Reuben membeli 3 500 saham dengan harga RM1.78 sesaham dan 5 500 saham dengan harga RM2.92 sesaham. Hitung kos purata untuk satu unit saham.

A RM5.48
B RM4.48
C RM3.48
D RM2.48

20. Miss Lindrey has produced a scale drawing of the pool to be built. The actual dimensions of the pond are 2 m wide and 6 m long. When she measured the drawing on her plan, she saw that the measurements were 8 cm wide and 24 cm long. Determine the scale used by Miss Lindrey.
Cik Lindrey telah menghasilkan lukisan skala kolam renang yang akan dibina. Dimensi sebenar bagi kolam adalah 2 m lebar dan 6 m panjang. Ketika dia mengukur lukisan pada pelannya, dia melihat bahawa ukuran adalah 8 cm lebar dan 24 cm panjang. Tentukan skala yang digunakan oleh Cik Lindrey.
A 1 : 25
B 25 : 1
C 1 : 4
D 4 : 1

21. Diagram 5 shows two triangles PQS and QRS.
Rajah 5 menunjukkan dua segi tiga PQS dan QRS.

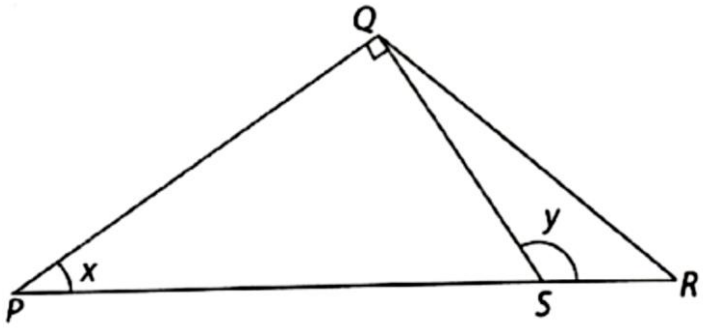


Diagram 5 / *Rajah 5*

Given $SR = 8$ cm, $PQ = 16$ cm and $5\ SR = 2\ PS$. Find the value of $\cos x + \tan y$.
Diberi $SR = 8$ *cm,* $PQ = 16$ *cm dan* $5\ SR = 2\ PS$. *Cari nilai* $\cos x + \tan y$.

A $-\frac{32}{15}$
B $\frac{32}{15}$
C $-\frac{8}{15}$
D $\frac{8}{15}$

22. Diagram 6 shows a circle with centre O. Given PR and QR are the tangents of the circle.
Rajah 6 menunjukkan sebuah bulatan yang berpusat O. Diberi PR dan QR ialah tangen bagi bulatan.

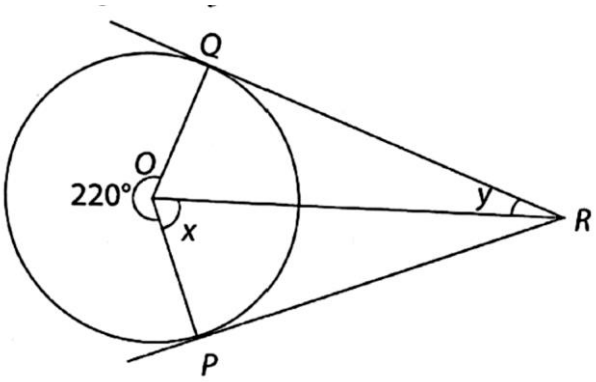


Diagram 6 / *Rajah 6*

Find the value of $x + y$.
Cari nilai $x + y$.

A 90°
B 110°
C 180°
D 220°

23. In Diagram 7, OP is parallel to QR.
Dalam Rajah 7, OP selari dengan QR.

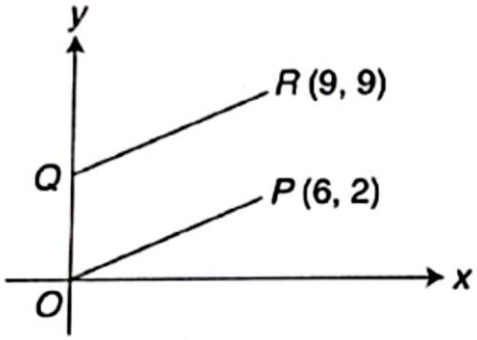


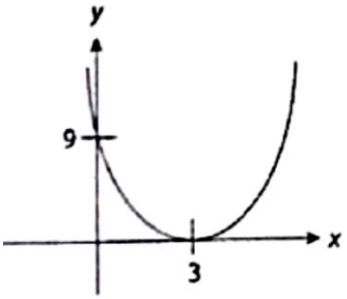
Diagram 7 / Rajah 7

Determine the y-intercept of line QR.
Tentukan pintasan-y bagi garis QR.

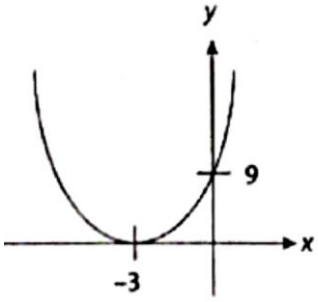
A 5
B 6
C 7
D 8

24. Which of the following graphs represents $y = 9 - 6x + x^2$?
Antara yang berikut, yang manakah mewakili graf $y = 9 - 6x + x^2$?

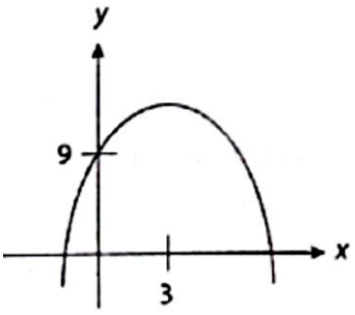
A



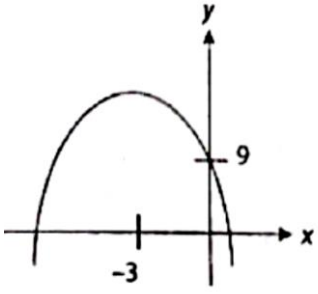
C



B



D



25. Given $542 = 10p6_8$, find the value of p.
Diberi $542 = 10p6_8$, cari nilai bagi p.

A 1
B 2
C 3
D 4

26. $210_3 + 121_3 =$

A 1011_3
B 1101_3
C 1110_3
D 1111_3

27. The total numbers of visitors to Zoo Negara in January is 20202_5. What is the average number of visitors to Zoo Negara each day in January if it opens every day?
Jumlah pengunjung yang melawat Zoo Negara pada bulan Januari adalah seramai 20202_5*. Berapakah bilangan purata pengunjung yang melawat ke Zoo Negara setiap hari pada bulan Januari jika dibuka setiap hari?*

A 39
B 40
C 41
D 42

28. Diagram 8 shows a Venn diagram with the universal set ξ={form five students in School Z}, set K = {students who registered for accounting} and set L = {students who registered for additional mathematics}.
Rajah 8 menunjukkan gambar rajah Venn dengan set semesta, ξ={murid-murid tingkatan 5 di sekolah Z}, set K = {*murid-murid yang mendaftar untuk subjek prinsip perakaunan*} *and set* L = {*murid-murid yang mendaftar untuk subjek matematik tambahan*}.

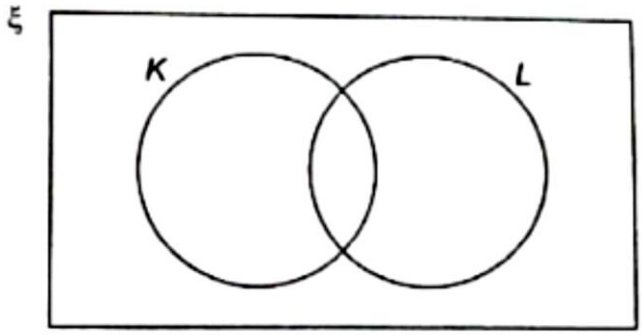


Diagram 8/ *Rajah 8*

It is given that $n(K \cap L') = 22$. The number of students who registered for accounting is 57, the number of students who registered for additional mathematics is 94 and the number of students who did not register for both subjects is 32. Calculate the number of form 5 students in School Z.
Diberi bahawa $n(K \cap L') = 22$*. Bilangan murid yang mendaftar untuk subjek Perakaunan ialah 57 orang, bilangan murid yang mendaftar untuk subjek Matematik Tambahan ialah 94 orang dan bilangan murid yang tidak mendaftar untuk kedua-dua subjek ini ialah 32 orang. Hitung jumlah bilangan murid Tingkatan 5 di Sekolah Z.*

A 141
B 143
C 145
D 148

29. Diagram 9 shows a graph.
Rajah 9 menunjukkan suatu graf.

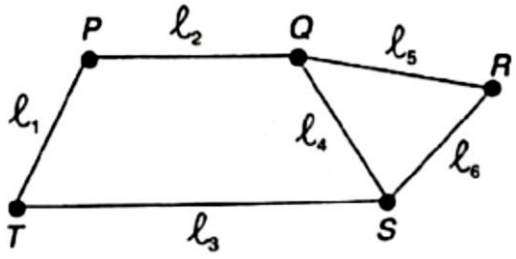
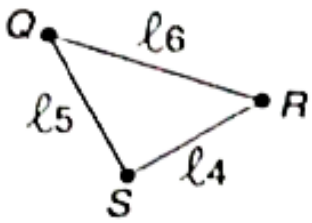


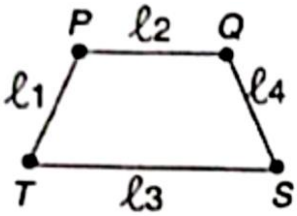
Diagram 9/ *Rajah 9*

Which of the following is **not** a subgraph of the graph?
*Antara berikut, yang manakah **bukan** satu subgraf bagi graf tersebut?*

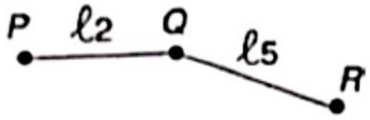
A



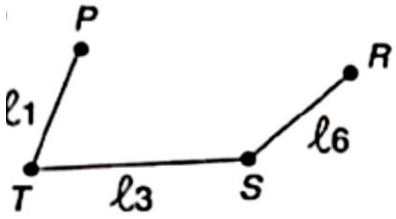
B



C

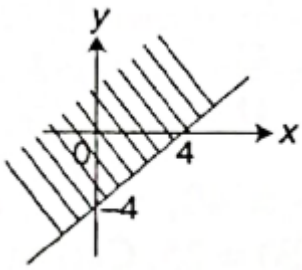


D

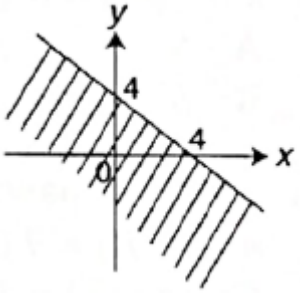


30. Which of the following shaded regions is represented by $x - y \geq 4$?
Antara berikut, kawasan berlorek yang manakah diwakili oleh $x - y \geq 4$?

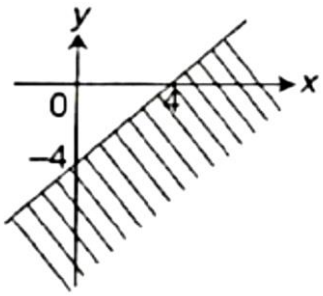
A



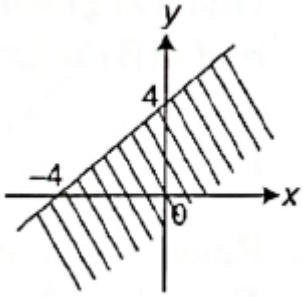
B



C



D



31. The following are long-term financial goals, **except**
Berikut merupakan matlamat kewangan jangka panjang, ***kecuali***

A Saving for retirement
Simpanan untuk persaraan
B Purchasing a new computer
Membeli computer baru
C Purchasing a house
Membeli rumah
D Saving for kid's education
Simpanan untuk pendidikan anak

32. Given that p varies inversely as the square root of q and $p = 8$ when $q = 25$. Express p in term of q.
Diberi bahawa p *berubah secara songsang dengan punca kuasa dua* q *dan* $p = 8$ *apabila* $q = 25$*. Ungkapkan* p *dalm sebutan* q*.*

A $p = 40\sqrt{q}$
B $p = \dfrac{8}{5\sqrt{q}}$
C $p = \dfrac{40}{\sqrt{q}}$
D $p = \dfrac{8}{5}\sqrt{q}$

33. Given p varies directly as m and inversely as cube of n, $m = 4$ and $n = 2$ when $p = 5$. Find the value of n when $m = 54$ and $p = 20$.
Diberi p *berubah secara langsung dengan* m *dan secara songsang dengan kuasa tiga* n*,* $m = 4$ *dan* $n = 2$ *apabila* $p = 5$*. Cari nilai* n *apabila* $m = 54$ *dan* $p = 20$*.*

A 3
B 6
C 9
D 10

34. Given / *Diberi*:

$$2\begin{pmatrix} 4 & 5 \\ -3 & 8 \end{pmatrix} - \begin{pmatrix} -2 & 3 \\ -4 & 10 \end{pmatrix} =$$

A $\begin{pmatrix} 10 & -2 \\ -2 & 6 \end{pmatrix}$

B $\begin{pmatrix} 10 & 18 \\ 8 & -6 \end{pmatrix}$

C $\begin{pmatrix} 8 & 18 \\ 8 & -6 \end{pmatrix}$

D $\begin{pmatrix} 10 & 7 \\ -2 & 6 \end{pmatrix}$

35. Find the values of g and h, such that
Cari nilai g dan h, jika

$$(4 \quad -2 \quad g)\begin{pmatrix}1 & 4\\ h & -2\\ 7 & 8\end{pmatrix} = (1 \quad 28)$$

A $g = 1\ ,\ h = -2$
B $g = 2\ ,\ h = 1$
C $g = 5\ ,\ h = 1$
D $g = 1\ ,\ h = 5$

36. William aged 35 years is quoted a rate of RM12.80 per RM1 000 assured per annum. He assures his life form RM120 000 but he wishes to pay the premium every month. The company states that for monthly payment, the premium is increased by 2 %. Calculate his monthly premium.
William yang berumur 35 tahun diberikan sebut harga sebanyak RM12.80 bagi setiap insurans RM1 000 setiap tahun. Dia membeli insurans hayat sebanyak RM120 000 tetapi dia ingin membayar premiumnya secara bulanan. Syarikat menyatakan bagi pembayaran bulanan, premium ditambah sebanyak 2 %. Hitung premium bulanannya.
A RM128.00
B RM130.56
C RM133.17
D RM160.64

37. A tax levied on income earned by an individual or a company in Malaysia is
Cukai yang dikenakan atas pendapatan yang diperoleh oleh seseorang individu atau sesebuah syarikat di Malaysia ialah
A Door tax / *cukai pintu*
B Income tax / *cukai pendapatan*
C Sales and service tax / *cukai jualan dan perkhidmatan*
D Road tax / *cukai jalan*

38. In Diagram 10, QRS is a straight line.
Dalam Rajah 10, QRS ialah garis lurus.

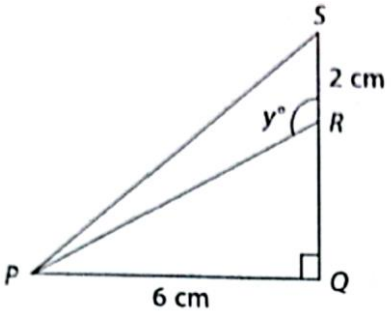
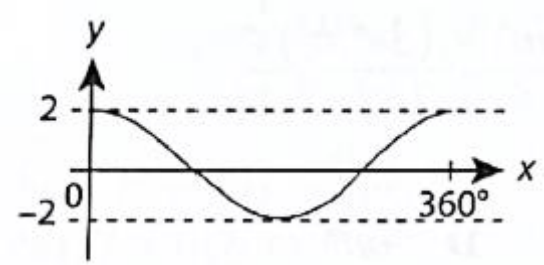


Diagram 10 / *Rajah 10*

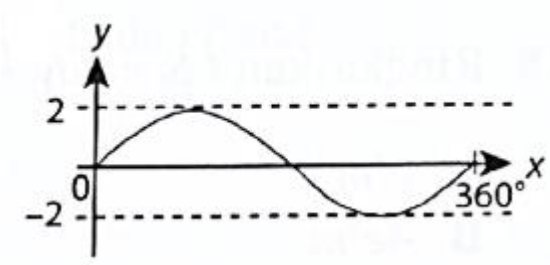
Given that tan $\angle SPQ = 1$, find the value of tan y°.
Diberi bahawa tan $\angle SPQ = 1$, cari nilai tan y°.
A $\frac{3}{2}$
B $\frac{2}{3}$
C $-\frac{3}{2}$
D $-\frac{2}{3}$

39. Which of the following represents the graph $y = 2\cos x$?
Antara yang berikut, yang manakah mewakili graf $y = 2\cos x$ *?*

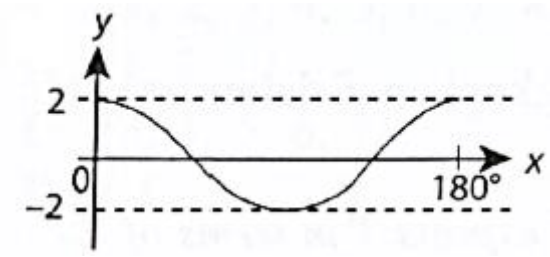
A



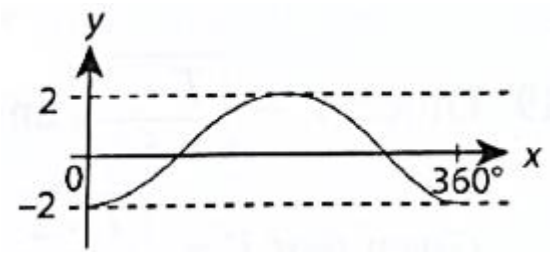
C



B



D



40. Diagram 11 shows the mathematical modeling process.
Rajah 11 menunjukkan proses permodelan matematik.

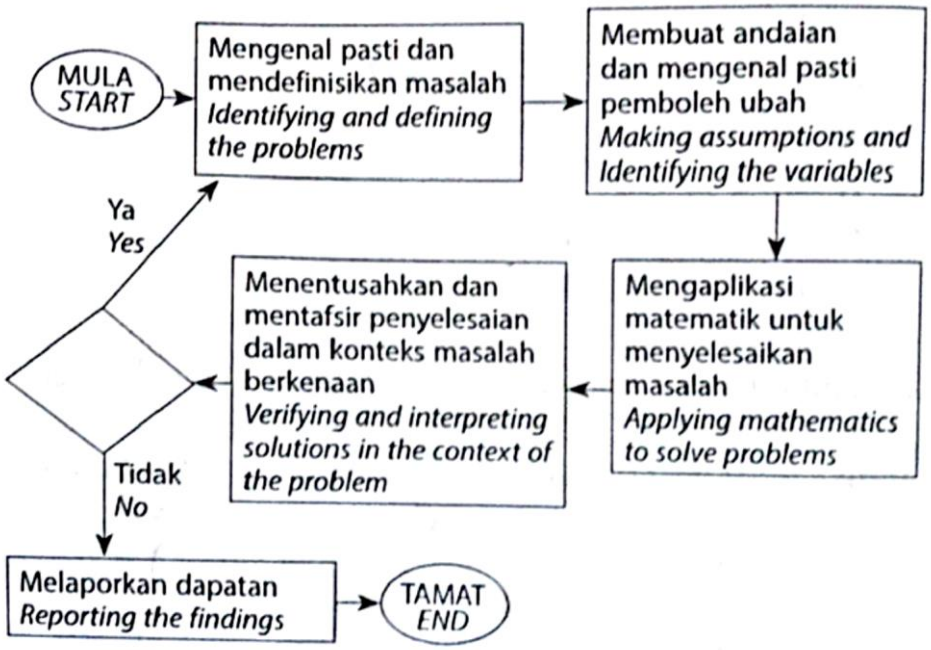


Diagram 11 / *Rajah 11*

The appropriate statement in the blank is:
Penyataan yang sesuai di tempat kosong ialah:

A Publish mathematical models
Menerbitkan model matematik
B Ask for expert opinion
Meminta pandangan pakar
C Need to refine the mathematical model?
Perlu memurnikan model matematik?
D Present a mathematical model
Membentangkan model matematik

END OF QUESTIONS

Jawapan:

1	B	11	B	21	C	31	B
2	C	12	D	22	A	32	C
3	C	13	B	23	B	33	A
4	A	14	A	24	A	34	D
5	A	15	B	25	C	35	D
6	D	16	A	26	B	36	B
7	D	17	A	27	D	37	B
8	B	18	D	28	D	38	C
9	C	19	D	29	A	39	A
10	C	20	A	30	C	40	C

RUMUS MATEMATIK
MATHEMATICAL FORMULAE

Rumus-rumus berikut boleh membantu anda untuk menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.
The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used

NOMBOR DAN OPERASI
NUMBERS AND OPERATIONS

1 $a^m \times a^n = a^{m+n}$

2 $a^m \div a^n = a^{m-n}$

3 $(a^m)^n = a^{mn}$

4 $a^{\frac{m}{n}} = (a^m)^{\frac{1}{n}}$

5 Faedah mudah / *Simple interest*, $I = Prt$

6 Nilai matang/*Maturity value*, $MV = P\left(1+\frac{r}{n}\right)^{nt}$

7 Jumlah bayaran balik / *Total repayment*, $A = P + Prt$

PERKAITAN
RELATIONS

1 Jarak / *Distance* $= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

2 Titik Tengah / *midpoint* $(x,y) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

3 Purata laju $= \dfrac{\text{jarak yang dilalui}}{\text{masa yang diambil}}$

Average speed $= \dfrac{\textit{distance travelled}}{\textit{time taken}}$

4 $m = \dfrac{y_2-y_1}{x_2-x_1}$

5 $m = -\dfrac{\text{pintasan-}y}{\text{pintasan-}x}$

$m = -\dfrac{y\textit{-intercept}}{x\textit{-intercept}}$

6 $A^{-1} = \dfrac{1}{ad-bc}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

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SUKATAN DAN GEOMETRI
MEASUREMENT AND GEOMETRY

1 Teorem Pythagoras / *Pythagoras Theorem* $c^2 = a^2 + b^2$

2 Hasil tambah sudut pedalaman poligon / *Sum of interior angles of a polygon*
$= (n-2) \times 180°$

3 Lilitan bulatan $= \pi d = 2\pi j$
Circumference of circle $= \pi d = 2\pi r$

4 Luas bulatan $= \pi j^2$
Area of circle $= \pi r^2$

5 $\dfrac{\text{Panjang lengkok}}{2\pi j} = \dfrac{\theta}{360°}$
$\dfrac{\text{Arc length}}{2\pi r} = \dfrac{\theta}{360°}$

6 $\dfrac{\text{Luas sektor}}{\pi j^2} = \dfrac{\theta}{360°}$
$\dfrac{\textit{Area of sector}}{\pi r^2} = \dfrac{\theta}{360°}$

7 Luas lelayang $= \dfrac{1}{2} \times$ hasil darab panjang dua pepenjuru

Area of kite $= \dfrac{1}{2} \times$ *product of two diagonals*

8 Luas trapezium $= \dfrac{1}{2} \times$ hasil tambah dua sisi selari $\times$ tinggi

Area of trapezium $= \dfrac{1}{2} \times$ *sum of parallel sides* $\times$ *height*

9 Luas permukaan silinder $= 2\pi j^2 + 2\pi jt$
Surface area of cylinder $= 2\pi r^2 + 2\pi rh$

10 Luas permukaan kon $= \pi j^2 + \pi js$
Surface area of cone $= \pi r^2 + \pi rs$

11 Luas permukaan sfera $= 4\pi j^2$
Surface area of sphere $= 4\pi r^2$

12 Isipadu prisma tegak = luas keratan rentas $\times$ tinggi
Volume of right prism = cross sectional area $\times$ *height*

13 Isipadu silinder $= \pi j^2 t$
Volume of cylinder $= \pi r^2 h$

Isipadu kon $= \dfrac{1}{3}\pi j^2 t$

14 *Volume of cone* $= \dfrac{1}{3}\pi r^2 h$

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15 Isipadu sfera $= \frac{4}{3}\pi j^3$

Volume of sphere $= \frac{4}{3}\pi r^3$

16 Isipadu piramid tegak $= \frac{1}{3} \times$ luas tapak $\times$ tinggi

Volume of right pyramid $= \frac{1}{3} \times$ *base area* $\times$ *height*

17 Faktor skala, $k = \frac{PA'}{PA}$

Scale factor, $k = \frac{PA'}{PA}$

18 Luas imej $= k^2 \times$ luas objek

Area of image $= k^2 \times$ *area of object*

STATISTIK DAN KEBARANGKALIAN
STATISTICS AND PROBABILITY

1 Min / *Mean*, $\bar{x} = \frac{\Sigma x}{N}$

2 Min / *Mean*, $\bar{x} = \frac{\Sigma fx}{\Sigma f}$

3 Varians / *Variance*, $\sigma^2 = \frac{\Sigma(x-\bar{x})^2}{N} = \frac{\Sigma x^2}{N} - \bar{x}^2$

4 Varians / *Variance*, $\sigma^2 = \frac{\Sigma f(x-\bar{x})^2}{\Sigma f} = \frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2$

5 Sisihan piawai / *Standard deviation*, $\sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{N}} = \sqrt{\frac{\Sigma x^2}{N} - \bar{x}^2}$

6 Sisihan piawai / *Standard deviation*, $\sigma = \sqrt{\frac{\Sigma f(x-\bar{x})^2}{\Sigma f}} = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - \bar{x}^2}$

7 $P(A) = \frac{n(A)}{n(S)}$

8 $P(A') = 1 - P(A)$

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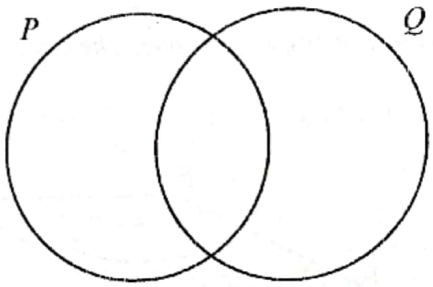
Bahagian A / *Section* A
[40 markah / *marks*]

Jawab **semua** soalan dalam bahagian ini.
Answer **all** *questions in this section.*

1. (a) Diberi bahawa set P = { lima gandaan empat yang pertama } dan set Q = { 4, 9, 16 }. Lengkapkan gambar rajah Venn di ruang jawapan untuk menunjukkan hubungan antara set P dan set Q.

It is given that set P = { first five multiples of four }, and set Q = { 4, 9, 16 }. Complete the Venn diagram in the answer space to show the relationship between set P and set Q.

Jawapan / *Answer* :

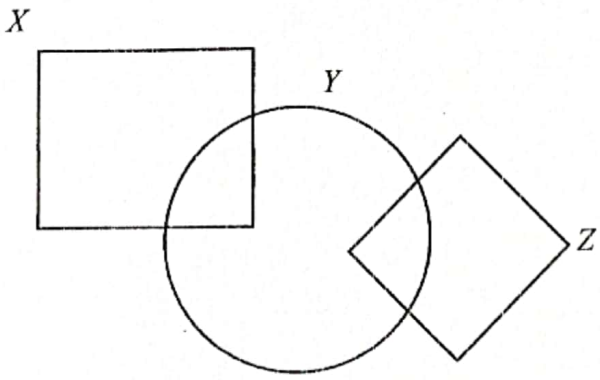


[1 markah / *mark*]

(b) Gambar rajah Venn di ruang jawapan menunjukkan set X, set Y dan set Z dengan keadaan set semesta, $\xi = X \cup Y \cup Z$.
Pada rajah di ruang jawapan, lorek set $X \cup Y \cap Z'$

The Venn diagram in the answer space shows set X, set Y and set Z such that the universal set, $\xi = X \cup Y \cup Z$.
On the diagram in the answer space, shade the set $X \cup Y \cap Z'$

Jawapan / *Answer* :



[2 markah / *marks*]

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2. Rajah 2 menunjukkan sebuah pepejal berbentuk prisma tegak dengan tapak segi empat tepat *ABCD* di atas meja mengufuk. Trapezium *ABGF* ialah keratan rentas seragam prism itu.
Sebuah kon dikeluarkan daripada prisma itu.

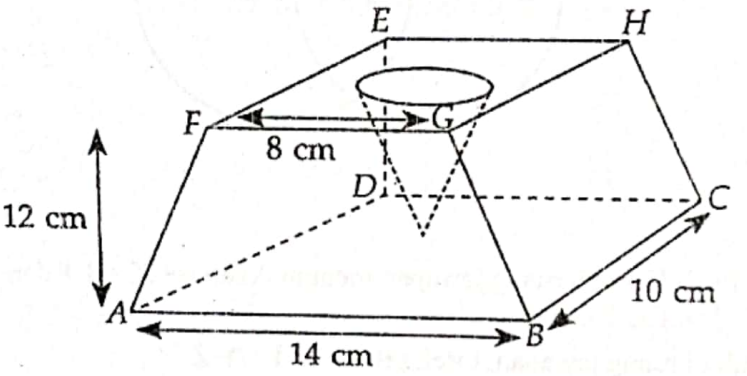
Diagram 2 shows a solid right prism with a rectangular base ABCD on a horizontal table. The trapezium ABGF is the uniform cross-section of the prism.
A cone is removed from the prism.

Diberi bahawa isipadu pepejal yang tinggal ialah $1230\frac{1}{6}$ cm^3 .

Menggunakan $\pi = \frac{22}{7}$, hitung jejari dalam cm, kon itu. Kon itu mempunyai diameter dan tinggi yang sama.

It is given that the volume of the remaining solid is $1230\frac{1}{6}$ cm^3.

Using $\pi = \frac{22}{7}$, *calculate the radius , in* cm, *of the cone. The cone has the same diameter and height.*



Rajah 2 / *Diagram* 2

[4 markah / *marks*]

Jawapan / *Answer* :

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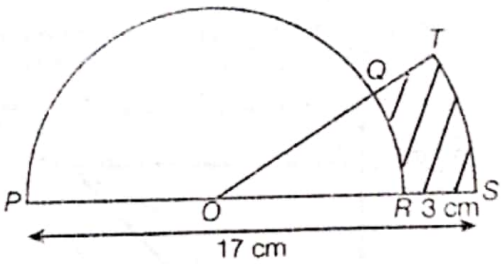
3. Rajah 3 menunjukkan semi bulatan, PQR dan sektor SOT, dengan pusat sepunya O. Diberi bahawa $\angle POQ : \angle SOT = 4 : 1$.

Diagram 3 shows a semicircle, PQR and sector SOT with a common centre O. It is given that $\angle POQ : \angle SOT = 4 : 1$.



Rajah 3 / *Diagram 3*

Menggunakan $\pi = \frac{22}{7}$, hitung luas, dalam cm^2, kawasan berlorek.

Using $\pi = \frac{22}{7}$, *calculate the area , in* cm^2, *of the shaded region.*

[3 markah / *marks*]

Jawapan / *Answer* :

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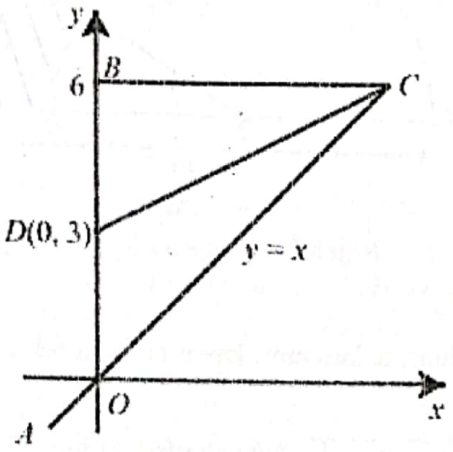
4. Rajah 4 menunjukkan garis lurus AC, garis lurus DC dan garis lurus BC yang dilukis pada suatu satah Cartesan dan O ialah asalan. Persamaan garis lurus AC ialah $y = x$. Garis lurus BC selari dengan paksi-x.

Diagram 4 shows straight line AC, straight line DC and straight line BC drawn on a Cartesian plane and O is the origin. The equation of the straight line AC is $y = x$. Straight line BC is parallel to x-axis.



Rajah 4 / *Diagram 4*

Cari

Find

(a) persamaan bagi garis lurus BC.

equation of the straight line BC.

(b) persamaan bagi garis lurus DC.

equation of the straight line DC.

[4 markah / *marks*]

Jawapan / *Answer* :

(a)

(b)

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5. Pada bulan Februari, Wong telah membelanjakan sebanyak RM400 untuk minyak kereta. Pada bulan Mac, harga minyak telah meningkat sebanyak RM0.10 per liter dan dia telah membelanjakan RM230 lebih daripada bulan Februari kerana keretanya menggunakan 100 liter minyak lebih daripada bulan Februari. Cari harga bagi 1 liter minyak pada bulan Mac.

[Diberi bahawa harga minyak adalah melebihi RM1 per liter]

In February, Wong spent RM400 *on car's petrol. In March, the price of petrol has increased by* RM0.10 *per litre and he spent* RM230 *more than February because his car used* 100 *litres of petrol more than February. Find the price of* 1 *litre of petrol in March.*

[It is given that the price of petrol is more than RM1 per litre].

[4 markah / *marks*]

Jawapan / *Answer* :

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6. (a) Nyatakan sama ada pernyataan berikut adalah benar atau palsu.

State whether the following statement is true or false.

$-6 > 2$ dan $(-3)^3 = -27$
$-6 > 2$ *and* $(-3)^3 = -27$

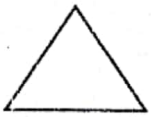
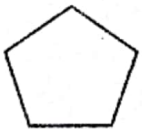
(b) Tulis **dua** implikasi berdasarkan pernyataan berikut :

Write down **two** *implications based on the following statements* :

$m + 4 = 11$ jika dan hanya jika $m = 7$
$m + 4 = 11$ *if and only if* $m = 7$

(c) Jadual 6 menunjukkan bilangan sisi dan sudut pedalaman bagi beberapa poligon sekata.

Table 6 shows the number of sides and the interior angles of some regular polygons.

Poligon sekata *Regular polygon*	Bilangan sisi *Number of sides*	Sudut pedalaman *Interior angle*
	3	$\frac{(3-2) \times 180°}{3}$
	4	$\frac{(4-2) \times 180°}{4}$
	5	$\frac{(5-2) \times 180°}{5}$

Jadual 6 / *Table 6*

Buat satu kesimpulan umum secara induktif untuk sudut pedalaman poligon sekata dengan n sisi.

Make a general conclusion by induction for the interior angle of a regular polygon with n sides.

[5 markah / *marks*]

Jawapan / *Answer* :

(a)

(b) Implikasi / *Implication* 1 : .....

Implikasi / *Implication* 2 : .....

(c)

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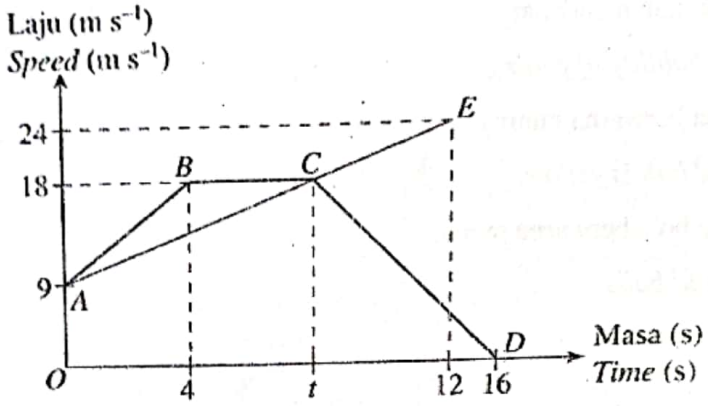
7. Rajah 7 menunjukkan graf laju-masa bagi pergerakan dua zarah, P dan Q, masing-masing dalam tempoh 12 saat dan 16 saat. Graf ACE mewakili pergerakan P dan graf $ABCD$ mewakili pergerakan Q. Kedua-dua zarah itu bermula pada titik yang sama dan melalui laluan yang sama.

Diagram 7 shows the speed-time graph for the movement of two particles, P and Q, for a period of 12 seconds and 16 seconds respectively. The graph ACE represents the movement of P and the graph ABCD represents the movement of Q. Both particles start at the same point and move along the same route.



Rajah 7 / *Diagram 7*

Diberi bahawa jarak yang dilalui oleh zarah Q adalah 27 meter lebih daripada jarak yang dilalui oleh zarah P apabila kedua-dua zarah itu mencapai laju yang sama pada t saat.
Hitung nilai t.

It is given that the distance travelled by particle Q is 27 metre more than the distance travelled by particle P when both particles reached the same speed at t seconds.
Calculate the value of t.

[3 markah / *marks*]

Jawapan / *Answer* :

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8. Sebuah kotak mengandungi 6 biji bola merah dan sebiji bola kuning. Dua biji bola dipilih secara rawak dari kotak itu satu demi satu tanpa pemulangan. Warna bola itu dicatatkan.

A box contains 6 red balls and a yellow ball. Two balls are chosen at random one by one from the box without replacement. The colours of the balls are recorded.

(a) Wakilkan situasi di atas dengan menggunakan gambar rajah pokok.

Represent the above situation by using a tree diagram.

(b) Hitung kebarangkalian mendapat

Calculate the probability of getting

(i) bola kedua berwarna kuning.

the second ball is yellow.

(ii) kedua-dua bola berwarna merah.

both are red balls.

[5 markah / *marks*]

Jawapan / *Answer* :

(a)

(b) (i)

(ii)

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9. Airil membeli 4 tiket wayang dewasa dan 2 tiket wayang kanak-kanak dengan harga RM68. Harga tiket dewasa adalah RM 5 lebih mahal berbanding tiket kanak-kanak.

Airil bought 4 *movie tickets for adults and* 2 *movie tickets for children with the price of* RM68. *The price of ticket for adult is* RM 5 *more expensive than ticket for children.*

Menggunakan kaedah matriks, hitung harga, dalam RM, bagi sekeping tiket wayang dewasa dan sekeping tiket wayang kanak-kanak.

Using the matrix method, calculate the price, in RM, *of a movie ticket for adult and a movie ticket for children.*

[5 markah / marks]

Jawapan / *Answer* :

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10. Encik Husnin ingin membeli insurans kebakaran rumahnya. Nilai boleh insurans rumahnya itu ialah RM300 000. Jadual 10 menunjukkan polisi insurans yang disediakan oleh SP Insurance Sdn. Bhd.

Encik Husnin wants to buy fire insurance for his house. The insurable value of his house is RM300 000. *Table* 10 *shows the insurance policy provided by SP Insurance Sdn. Bhd.*

Polisi insurans kebakaran oleh SP Insurance Sdn. Bhd. ***Fire insurance policy by SP Insurance Sdn. Bhd.***	
Ko-insurans *Co-insurance*	80%
Deduktibel *Deductible*	RM4 000

Jadual 10 / *Table* 10

(i) Hitung jumlah insurans yang perlu dibeli oleh Encik Husnin bagi rumahnya itu.

Calculate the amount of insurance need to buy Encik Husnin for his house.

(ii) Hitung bayaran pampasan yang diterima oleh Encik Husnin jika dia telah menginsuranskan rumahnya dengan jumlah RM180 000 dan rumahnya telah terbakar dengan jumlah kerugian sebanyak RM70 000.

Calculate the amount of compensation that Encik Husnin will receive if he insured his house at a sum of RM180 000 *and his house caught on fire with the amount of loss is* RM70 000

[4 markah / *marks*]

Jawapan / *Answer* :

(i)

(ii)

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Bahagian B / *Section B*
[45 markah / *marks*]

Jawab **semua** soalan dalam bahagian ini.
Answer **all** *questions in this section.*

11. (a) Lengkapkan Jadual 11 di ruang jawapan bagi persamaan $y = x^3 - 2x - 12$ dengan menulis nilai-nilai y apabila $x = -2$, $x = 1$ dan $x = 3$.

Complete Table 11 *in the answer space for the equation* $y = x^3 - 2x - 12$ *by writing down the values of* y *when* $x = -2$, $x = 1$ *and* $x = 3$.

[3 markah / *marks*]

(b) Untuk ceraian soalan ini, gunakan kertas yang disediakan. Anda boleh menggunakan pembaris fleksibel.

Dengan menggunakan skala 2 cm kepada 1 unit pada paksi $-x$ dan 2 cm kepada 10 unit pada paksi $-y$, Lukis graf $y = x^3 - 2x - 12$ untuk $-3 \leq x \leq 4$.

For this part of the question, use the graph paper provided. You may use a flexible curve ruler.

Using a scale of 2 cm *to* 1 *unit on the* x *– axis and* 2 cm *to* 10 *units on the* y *– axis, draw the graph of* $y = x^3 - 2x - 12$ *for* $-3 \leq x \leq 4$.

[4 markah / *marks*]

(c) Daripada graph di 11(b), cari

From the graph in 11(b), *find*

(i) nilai y apabila $x = -2.2$
the value of y *when* $x = -2.2$

(ii) nilai x apabila $y = 4$
the value of x *when* $y = 4$

[2 markah / *marks*]

Jawapan / *Answer* :

(a) $y = x^3 - 2x - 12$

x	-3	-2	-1	0	1	2	3	3.5	4
y	-33		-11	-12		-8		23.88	44

Jadual 11 / *Table* 11

(b) Rujuk graph.

Refer to the graph.

(c) (i) $y =$ .....

(ii) $x =$ .....

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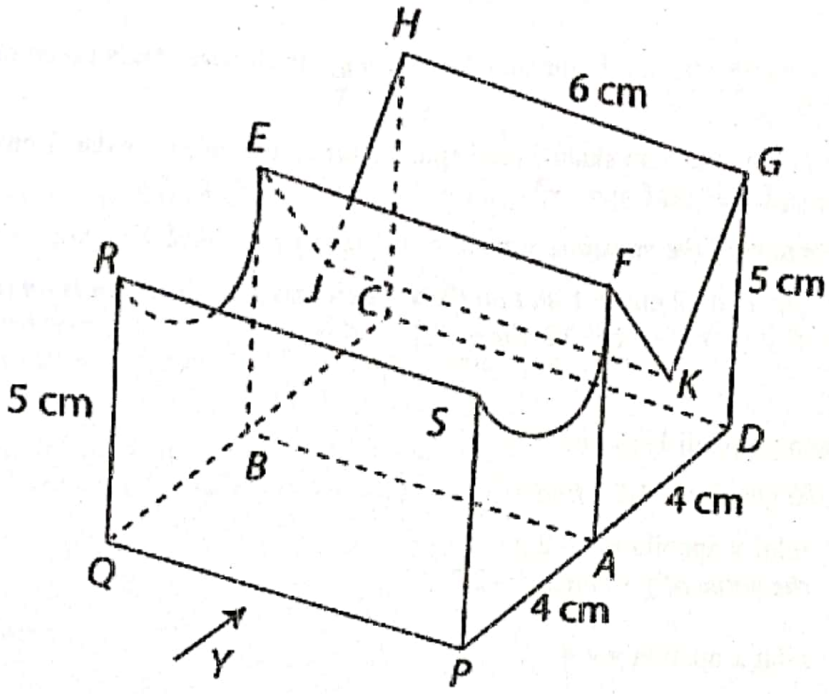
12. Anda tidak dibenarkan menggunakan kertas graf untuk menjawab soalan ini.

You are not allowed to use a graph paper to answer this questions.

Rajah 12 menunjukkan gabungan dua prisma yang bercantum pada satah *ABEF*. Permukaan *APSF* ialah keratan rentas seragam prisma itu dan *SREF* ialah separuh silinder. Segi empat tepat *PQRS* ialah satah mencancang. Tapak *PQBCDA* adalah pada satah mengufuk. Tinggi tegak *K* dari tapak ialah 2 cm.

Diagram 12 *shows a combination of two prisms joining to the plane ABEF. The surface of the APSF is the cross-section of the prism and the SREF is a half cylinder. The rectangle PQRS is the vertical plane. The base PQBCDA is on the horizontal plane. The vertical height of K from base is* 2 cm.



Rajah 12 / *Diagram* 12

Lukis dengan skala penuh

Draw to full scale

(a) Pelan pepejal itu.

The plan of the solid.

[4 markah / *marks*]

(b) dongakan gabungan pepejal itu pada satah mencancang yang selari dengan *PQ* sebagaimana dilihat dari *Y*.

The elevation of the combined solid on a vertical plane parallel to PQ as viewed from Y.

[5 markah / *marks*]

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Jawapan / *Answer* :

(a)

(b)

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13. Jadual 13 menunjukkan anggaran perbelanjaan bulanan bagi Singam.

Table 13 shows the estimated monthly expenses of Singam.

Perbelanjaan *Expenses*	**RM**
Ansuran pinjaman perumahan / *Housing loan instalment*	1 200
Ansuran pinjaman kereta / *Car loan instalment*	700
Insurans / *Insurance*	350
Barang-barang runcit + Bil utility / *Groceries + Utility bills*	400
Petrol / *Petrol*	300
Pemberian kepada ibu bapa / *Allowance for parents*	500
Anak-anak / *Children*	250
Makanan / *Food*	1 450

Jadual 13 / *Table 13*

Berikut menunjukkan dua matlamat kewangan yang ditetapkan oleh Singam.

The following shows two financial goals set by Singam.

Jangka pendek / *Short term*

Membeli sebuah motosikal baharu dengan harga RM5 000 untuk anaknya dalam enam bulan.

To buy a new motorcycle priced at RM5 000 *for his son in six months.*

Jangka panjang / *Long term*

Membeli seunit kondominium baharu dengan harga RM550 000 dalam lima tahun. Wang pendahuluan ialah 10% daripada harga kondominium itu.

To buy a new condominium priced at RM550 000 *in five years. The down payment is* 10% *of the price of the condominium.*

Gaji bersih bulanan Singam ialah RM7 560. Dia ingin menyimpan 15% daripada gajinya untuk dana kecemasan.

Singam's monthly net salary is RM7 560. *He plans to save* 15% *of his salary for emergency fund.*

(a) Hitung simpanan bulanan Singam untuk dana kecemasan.

Calculate Singam's monthly savings for emergency fund.

[1 markah / *mark*]

(b) Lengkapkan pelan kewangan bulanan bagi Singam.

Complete the monthly financial plan for Singam.

[5 markah / *marks*]

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(c) Berdasarkan pelan kewangan bulanan di (b), bolehkah Singam mencapai kedua-dua matlamat kewangannya? Jelaskan jawapan anda.

Based on the monthly financial plan in (b), *will Singam be able to achieve his two financial goals? Explain your answer.*

[3 markah / *marks*]

Jawapan / *Answer* :

(a)

(b)

Pendapatan dan Perbelanjaan **Income and Expenses**	**RM**	
Pendapatan bersih / *Net income*	7 560	
Jumlah pendapatan bulanan / *Total monthly income*	7 560	
Tolak simpanan bagi dana kecemasan / *Minus savings for emergency fund*		
Baki pendapatan / *Income balance*		
Tolak perbelanjaan tetap bulanan / *Minus monthly fixed expenses*		
Jumlah perbelanjaan tetap bulanan / *Total monthly fixed expenses*		
Tolak perbelanjaan tidak tetap bulanan / Minus monthly variables expenses		
Barang-barang runcit + Bil utiliti / *Groceries + Utility bills*	400	
Jumlah perbelanjaan tidak tetap bulanan / *Total monthly variable expenses*		
Pendapatan lebihan / *Surplus of income*		

(c)

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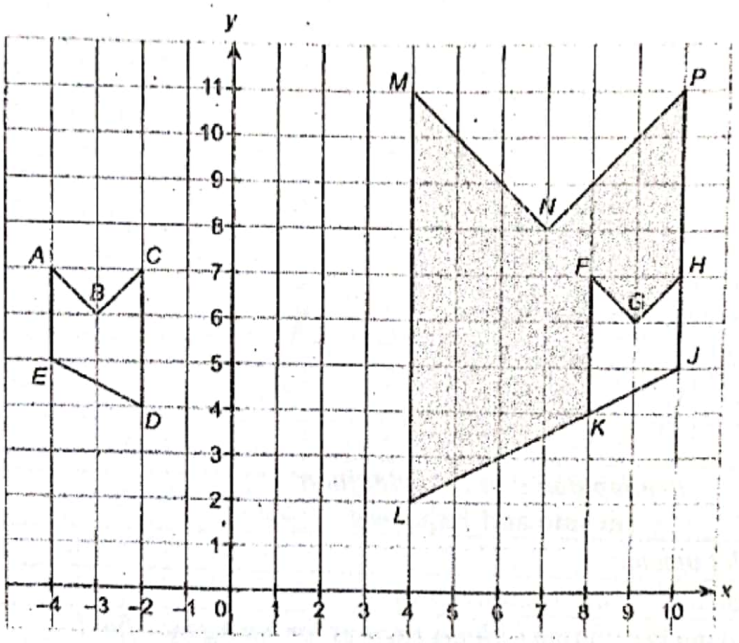
14. Rajah 14 menunjukkan tiga buah pentagon, *ABCDE*, *FGHJK* dan *JLMNP* yang dilukis di atas suatu satah Cartes.

Diagram 14 *shows three pentagons, ABCDE, FGHJK and JLMNP drawn on a Cartesian plane.*



Rajah 14 / *Diagram* 14

(a) Pentagon *JLMNP* ialah imej bagi pentagon *ABCDE* di bawah gabungan transformasi **RS**. Huraikan selengkapnya, transformasi

Pentagon JLMNP is the image of the pentagon ABCDE under the combined transformation **RS**. *Describe in full, the transformation*

(i) **S** (ii) **R**

[5 markah / *marks*]

(b) Diberi bahawa pentagon *ABCDE* mewakili suatu kawasan yang mempunyai luas 40 m^2. Hitung luas, dalam m^2, yang diwakili oleh kawasan berlorek.

It is given that pentagon ABCDE represents a region of area 40 m^2. *Calculate the area, in* m^2, *represented by the shaded region.*

[3 markah / *marks*]

Jawapan / *Answer* :

(a) (i) **S** : .....

R : .....

(ii)

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15. Jadual 15 (i) menunjukkan taburan kekerapan jisim, dalam kg, bagi 100 orang murid di sebuah sekolah.

Table 15 (i) *shows the frequency distributions of mass, in kg, of* 100 *students in a school.*

Jisim (kg) / *Mass* (kg)	**Kekerapan / *Frequency***
40 – 49	8
50 – 59	15
60 – 69	30
70 – 79	27
80 – 89	14
90 – 99	6

Jadual 15 (i) / *Table* 15 (i)

(a) Berdasarkan Jadual 15 (i), lengkapkan Jadual 15 (ii) di ruang jawapan.

Based on Table 15 (i), *complete Table* 15 (ii) *in the answer space.*

[2 markah / *marks*]

(b) Untuk ceraian soalan ini anda dibenarkan menggunakan pembaris fleksibel.

For this part of the question, you may use a flexible curve ruler.

Dengan menggunakan skala 2 cm kepada 10 kg pada paksi mengufuk dan 2 cm kepada 10 orang murid pada paksi mencancang, Lukis satu ogif bagi data itu.

By using a scale of 2 cm *to* 10 kg *on the horizontal axis and* 2 cm *to* 10 *students on the vertical axis, draw an ogive for the data.*

[4 markah / *marks*]

(c) Hitung sisihan piawai bagi jisim murid-murid tersebut.

Calculate the standard deviation of the student's mass.

[4 markah / *mass*]

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Jawapan / *Answer* :

(a)

Jisim (kg) *Mass (kg)*	Kekerapan *Frequency*	Titik tengah *Midpoint*	Sempadan atas *Upper boundary*	Kekerapan longgokan *Cumulative frequency*
30 – 39	0	34.5	39.5	0
40 – 49	8	44.5		
50 – 59	15	54.5		
60 – 69	30	64.5		
70 – 79	27	74.5		
80 – 89	14	84.5		
90 – 99	6	94.5		

Jadual 15 (ii) / *Table* 15 (ii)

(b) Rujuk graf.

Refer to the graph.

(c)

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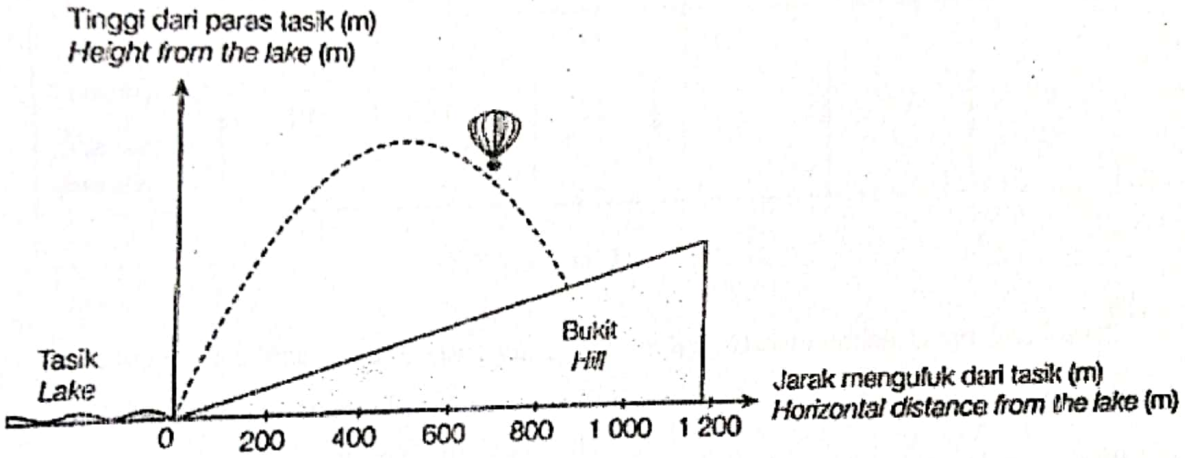
Bahagian C / *Section C*
[15 markah / *marks*]

Jawab **satu** soalan dalam bahagian ini.
Answer **one** *question in this section.*

16. Sebuah belon udara panas berlepas dari kaki sebuah bukit yang berdekatan dengan sebuah tasik seperti yang ditunjukkan dalam Rajah 16.

A hot air ballon takes off from the foot of a hill near a lake as shown in Diagram 16.



Rajah 16 / *Diagram* 16

Laluan penerbangan belon udara panas itu diwakili oleh fungsi, $f(x) = -\frac{3}{12\,500}x^2 + \frac{6}{25}x$.

Tinggi bukit itu berubah secara langsung dengan jarak mengufuk dari tasik itu pada kadar pertambahan 3 m jarak mencancang bagi setiap 100 m jarak mengufuk.

The path of the hot air ballon follow is represented by the function, $f(x) = -\frac{3}{12\,500}x^2 + \frac{6}{25}x$.

The height of the hill varies directly as the horizontal distance from the lake at an increasing rate of 3 m *vertical distance for each* 100 m *horizontal distance.*

(a) (i) Berapakah tinggi maksimum yang boleh dicapai belon udara panas itu dari paras air tasik itu ?

What is the maximum height that can be achieved by the hot air ballon above the lake level ?

(ii) Nyatakan fungsi $b(x)$ bagi tinggi bukit itu.

State the function $b(x)$ *for the height of the hill.*

(iii) Di manakah kedudukan belon udara panas itu apabila mendarat ?

What is the position of the hot air ballon when landing ?

[8 markah / *marks*]

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Jawapan / *Answer* :

(a) (i)

(ii)

(iii)

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(b) Jadual 16 menunjukkan bilangan penumpang yang menaiki belon udara bagi bulan Januari hingga bulan Julai

Table 16 shows the number of passengers who take the hot air ballon from the month January to July.

Bulan ***Month***	Januari *January*	Februari *February*	Mac *March*	April *April*	Mei *May*	Jun *June*	Julai July
Bilangan Penumpang ***Number of passengers***	19	18	15	14	17	16	13

Jadual 16 / *Table 16*

(i) Hitung min bilangan penumpang yang menaiki belon udara panas dalam satu bulan.

Calculate the mean number of passengers who take the hot air ballon in a month.

(ii) Hitung varians bagi bilangan penumpang dalam satu bulan dari bulan Januari hingga bulan Julai.

Calculate the variance for the number of passengers in a month from the month of January to the month of July.

(iii) Jika bilangan penumpang adalah dua kali ganda bagi setiap bulan dari bulan Januari hingga bulan Julai, hitung sisihan piawai baharu.

If the number of passengers is twice the original number for each month from the month of January to July, calculate the new standard deviation.

[7 markah / *marks*]

Jawapan / *Answer* :

(b) (i)

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(ii)

(iii)

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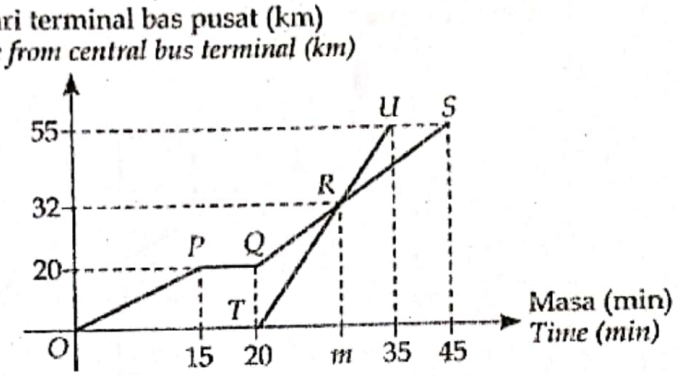
17. Graf jarak-masa dalam Rajah 17 menunjukkan perjalanan dua buah bas dari terminal bas pusat ke Stesen Z dengan menggunakan laluan yang sama. *OPQRS* mewakili perjalanan bas *A* manakala *TRU* mewakili perjalanan bas *B*. Bas *A* bertolak pada pukul 6:30 a.m. Dalam perjalanan, bas itu berhenti untuk mengambil beberapa penumpang. Bas *B* bertolak pada pukul 6:50 a.m. Kedua-dua bas bertemu di bandar *R* pada waktu *m*.

The distance-time graph in the Diagram 17 *shows the journey of two buses from the central bus terminal to Station Z by using the same route. OPQRS represents the journey of bus A while TRU represents the journey of bus B. Bus A departs* 6:30 *a.m. During the journey, the bus stops to pick up some passengers. Bus B departs at* 6.50 *a.m. Both buses meet at town R at time m.*



Rajah 17 / *Diagram* 17

(a) (i) Nyatakan tempoh masa, dalam minit, bas *A* berhenti untuk mengambil penumpang.
State the duration, in minutes, bus A stops to pick up the passengers.

(ii) Hitung jarak, dalam km, yang dilalui oleh bas *A* apabila ia bertemu dengan bas *B* di bandar *R*.
Calculate the distance, in km, *travelled by bus A when it meets bus B at town R.*

(iii) Cari laju, dalam kmj^{-1}, bagi bas *A* selepas melalui bandar *R*. beri jawapan dalam 2 tempat perpuluhan.
Find the speed, in kmh^{-1} *, of bus A after passing through town R. Give the answer in* 2 *decimal places.*

[6 markah / *marks*]

Jawapan / *Answer* :

(a) (i)

(ii)

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(iii)

(b) Alvin menaiki bas ke sekolah. Oleh kerana Alvin tinggal di kawasan pedalaman, hanya dua buah bas sahaja melalui kawasan tersebut sama ada bas *A* atau bas *B*. Ini menyebabkan Alvin kerap datang lewat ke sekolah. Kebarangkalian Alvin menaiki bas *A* ialah $\frac{3}{5}$. Jika dia menaiki bas *A*, kebarangkalian dia lewat ke sekolah ialah $\frac{2}{7}$ dan jika dia menaiki bas *B*, kebarangkalian dia lewat ke sekolah ialah $\frac{1}{8}$.

Alvin takes a bus to school. Since Alvin lives in a remote area, only two buses pass through the area either bus A or bus B. Due to this, Alvin is often late to school. The probability of Alvin taking bus A to school is $\frac{3}{5}$. *If he takes bus A, the probability that he will be late for school is* $\frac{2}{7}$ *and if he takes bus B, the probability that he will be late for school is* $\frac{1}{8}$.

(i) Lengkapkan gambar rajah pokok untuk menunjukkan semua kesudahan yang mungkin.
Complete a tree diagram to show all the possible outcomes.

(ii) Cari kebarangkalian bahawa dia menaiki bas *A* dan lewat ke sekolah.
Find the probability that he travels by bus A and late for school.

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(iii) Cari kebarangkalian bahawa
Find the probability that

(a) dia lewat ke sekolah.
he is late for school.

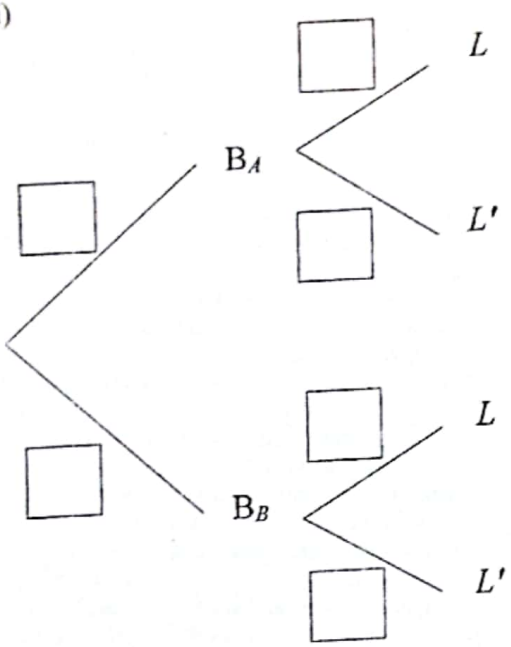
(b) dia tidak lewat ke sekolah,
he is not late for school.

[9 markah / *marks*]

Jawapan / *Answer* :

Bas A / *Bus A* = B_A Bas B / *Bus B* = B_B Lewat / *Late* = L Tidak lewat / *Not late* = L'

(b) (i)



(ii)

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(iii) (a)

(b)

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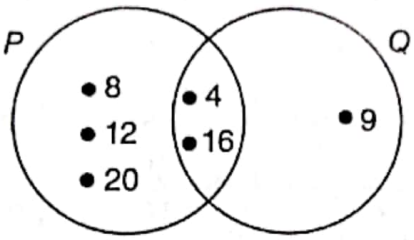
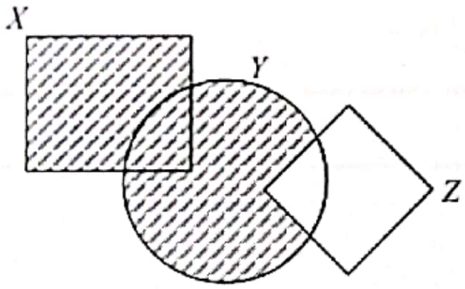
1. (a)



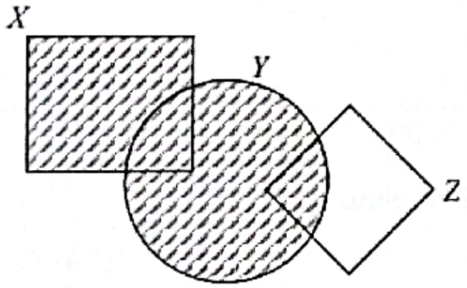
1m

(b)



2m

Note :



$X \cup Y$ award K1

2.

$\frac{1}{3} \times \frac{22}{7} \times r^2 \times 2r$ — 1m

$\frac{1}{2}(8+14) \times 12 \times 10$ — 1m

$\frac{1}{2} \times (8+14) \times 12 \times 10 - \frac{1}{3} \times \frac{22}{7} \times r^2 \times 2r = 1230\frac{1}{6}$ — 1m

$\frac{44r^3}{21} = \frac{539}{6}$ or equivalent

$r^3 = \frac{343}{8}$ *or* $42\frac{7}{8}$ or equivalent

3.5 cm — 1m

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3.		$\frac{36}{360} \times \frac{22}{7} \times 10^2$ *or* $\frac{36}{360} \times \frac{22}{7} \times 7^2$ *or* equivalent	1m
		$\frac{36}{360} \times \frac{22}{7} \times 10^2 - \frac{36}{360} \times \frac{22}{7} \times 7^2$ *or* equivalent	1m
		$\frac{561}{35}$ *or* $16\frac{1}{35}$ *or* 16.03	1m
		Note : 1. Accept π for K mark. 2. Accept correct value from incomplete substitution, for K mark. 3. Correct answer from incomplete working, award Kk2.	
4.	(a)	$y = 6$	1m
	(b)	$m = \frac{1}{2}$ *or* equivalent	1m
		$3 = \frac{1}{2}(0) + c$ *or* $c = 3$	1m
		$y = \frac{1}{2}x + 3$	1m
5.		Let the price of 1 litre of petrol in March be x and the price of petrol in February be $(x - 10)$. Total of petrol used in March – total of petrol used in February = 100.	
		$\frac{63\,000}{x} - \frac{40\,000}{x-10} = 100$ *or* equivalent	1m
		$\frac{630}{x} - \frac{400}{x-10} = 1$	
		$x^2 - 240x + 6300 = 0$	1m
		$(x - 210)(x - 30) = 0$	1m
		$x = 210$, $x = 30$ (reject)	
		$\therefore$ the price of 1 litre of petrol in March is RM2.10	1m
6.	(a)	False	1m
	(b)	Implication 1 : If $m + 4 = 11$ then $m = 7$	1m
		Implication 2 ; If $m = 7$ then $m + 4 = 11$	1m
	(c)	$\frac{(n-2) \times 180°}{n}$	1m
		$n = 3, 4, 5, \ldots$	1m

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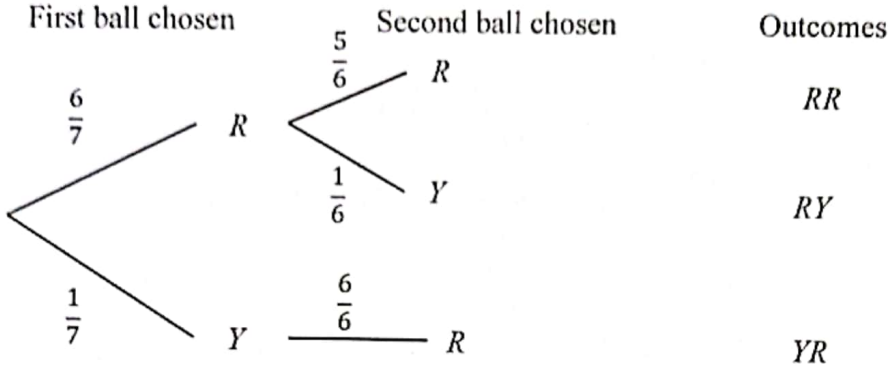
7.	$\frac{1}{2}(9+18)\times 4+(t-4)\times 18$ *or* $\frac{1}{2}(9+18)\times t$	1m
	$\frac{1}{2}(9+18)\times 4+(t-4)\times 18 - \frac{1}{2}(9+18)\times t = 27$	1m
	$t = 10$ seconds	1m
8.	(a) 	1m
	(b) (i) P (RY) $\left(\frac{6}{7}\times\frac{1}{6}\right)$	1m
	$\frac{1}{7}$	1m
	(ii) P (RR) $\left(\frac{6}{7}\times\frac{5}{6}\right)$	1m
	$\frac{5}{7}$	1m
9.	$4x+2y=68$ $x-y=5$	1m 1m
	$\begin{bmatrix}4 & 2\\ 1 & -1\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix}=\begin{bmatrix}68\\ 5\end{bmatrix}$	
	$\begin{bmatrix}x\\ y\end{bmatrix}=\frac{1}{4(-1)-2(1)}\begin{bmatrix}-1 & -2\\ -1 & 4\end{bmatrix}\begin{bmatrix}68\\ 5\end{bmatrix}$	1m
	∴ The price of a movie ticket for adult = RM13 The price of a movie ticket for children = RM8	1m 1m
	or $x=13$ $y=8$	
	Note : 1. Do not accept * $\begin{pmatrix}inverse\\ matrix\end{pmatrix}=\begin{pmatrix}4 & 2\\ 1 & -1\end{pmatrix}$	

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		2. $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 13 \\ 8 \end{pmatrix}$ as final answer, award N1. 3. Do not accept any solutions solved not using matrix method.	
10	(i)	$\frac{80}{100} \times$ RM300 000 RM240 000	1m 1m
	(ii)	$\frac{\text{RM180 000}}{\text{RM240 000}} \times$ RM70 000 − RM4000 RM48 500	1m 1m
11	(a)	− 16 − 13 9	1m 1m 1m
	(b)	Graph Axes drawn in correct directions with uniform scales for $-3 \leq x \leq 4$ and $-33 \leq y \leq 44$ All 6 points and *3 points correctly plotted or curve passes through all the points $-3 \leq x \leq 4$ and $-33 \leq y \leq 44$ Note : 1. 8 or 7 points correctly plotted, award K1 2. Ignore curve out of range Smooth and continuous curve without any straight line passing through all 9 correct points using the given scales for $-3 \leq x \leq 4$ and $-33 \leq y \leq 44$	1m 2m 1m
	(c)	(i) $y = -19 \leq x \leq -17$ $(y = -18)$ (ii) $x = 2.7 \leq y \leq 2.9$ $(x = 2.8)$ Note: 1. Allow P mark or N mark if values of x and of y are shown on graph. 2. Values of x and y obtained by calculations, award **P0** or **N0**. 3. Values of x and of y obtained from wrong graph, award **P0**.	1m 1m

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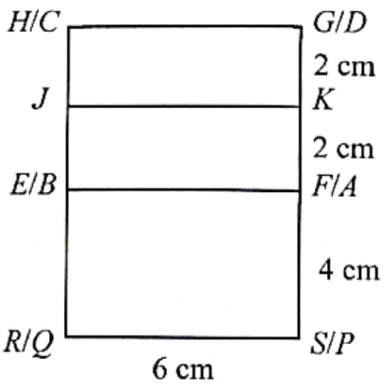
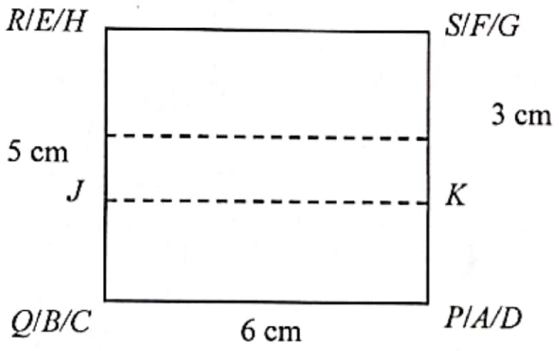
12	(a)	Plan  Correct shape with rectangle *PQDC*, *PQAB*, *ABKJ* and *KJDC* All solid lines. $QC > QP > PA = AD$ Measurements correct to $\pm$ 0.2 cm (one way) and all angles at vertices of rectangles = 90° $\pm$ 1°.	 1m 1m 2m
	(b)	Elevation from *Y*  Correct shape with rectangle *PQSR* All solid lines. (Ignore *JK*) *J* $\longrightarrow$ *K* joined by a dashed line to form rectangle *PQKJ* and *KJSR* $PQ > QR > JR > QJ$ Measurements correct to $\pm$ 0.2 cm (one way) and all angles at vertices of rectangles = 90° $\pm$ 1°.	 1m 1m 1m 2m
13	(a)	$\frac{15}{100} \times$ RM7560 RM1134	 1m

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(a) 1134

	(b)			

Income and Expenses	RM		
Net income	7 560		
Total monthly income	7 560		
Minus savings for emergency fund	**1 134**		
Income balance		**6426**	1m
Minus monthly fixed expenses			
Housing loan instalment	1 200		1m
Car loan instalment	700		
Insurance	350		
Total monthly fixed expenses		**2250**	
Minus monthly variables expenses			
Groceries + Utility bills	400		
Petrol	300		1m
Allowance for parents	500		
Children	250		
Food	1450		
Total monthly variable expenses		**2900**	
Surplus of income		**1276**	1m

2250 or **2900** 1m

	(c)	Savings in 6 months = RM 1276 × 6 = RM 7656 or Savings in 5 years = RM 1276 × 5 × 12 = RM 76 560	1m
		RM 7656 > RM 5000 ∴ short term can be achieved	1m
		Net savings = RM 76 560 – RM 5000 = RM 71 560 RM 71 560 > RM 55 000 ∴ long term can be achieved	1m
14	(a)	(i) **S** = is a reflection on line $x = 3$ Note : 1. Reflection award P1 **R** : is an enlargement with scale factor of 3 about centre *J or* (10, 5) Note : 1. Enlargement, scale factor 3 award P2 2. Enlargement, centre *J or* (10, 5) award P2 Enlargement award P1	2m 3m
	(b)	$40 \times 3^2 - 40$ Note : $40 \times (3)^2$, award K1 320 m^2	2m 1m

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15 (a)

	Jisim (kg) *Mass (kg)*	Kekerapan *Frequency*	Titik tengah *Midpoint*	Sempadan atas *Upper boundary*	Kekerapan longgokan *Cumulative frequency*
	30 – 39	0	34.5	39.5	0
I	40 – 49	8	44.5	49.5	8
II	50 – 59	15	54.5	59.5	23
III	60 – 69	30	64.5	69.5	53
IV	70 – 79	27	74.5	79.5	80
V	80 – 89	14	84.5	89.5	94
VI	90 – 99	6	94.5	99.5	100

Upper boundary : (I to VI) 1m
Cumulative frequency : (I to VI) 1m

(b) Graph

Axes drawn in the correct direction, uniform scale for $39.5 \leq x \leq 99.5$ and $0 \leq y \leq 100$ 1m

7 points plotted correctly *or* the ogive passed through them. 2m

Note :
5 or 6 points plotted correctly award K1

Smooth curve passing through 7 points 1m

(c) Mean = 68.7 1m

$\sum fx^2 = 488\,605$ 1m

$\sqrt{\frac{488\,605}{100} - 68.7^2}$ 1m

12.8981 or 12.90 1m

16 (a)

(i) $x = \frac{-\frac{6}{25}}{2\left(-\frac{3}{12500}\right)}$ 1m

$-\frac{3}{12500}(500)^2 + \frac{6}{25}(500)$ 1m

60 m 1m

(ii) $b(x) = \frac{3}{100}\,x$ 1m

(iii) $= -\frac{3}{12\,500}x^2 + \frac{6}{25}x = \frac{3}{100}\,x$ 1m

$x(x - 875) = 0$ 1m

$x = 875$ *or* $y = 26.25$ 1m

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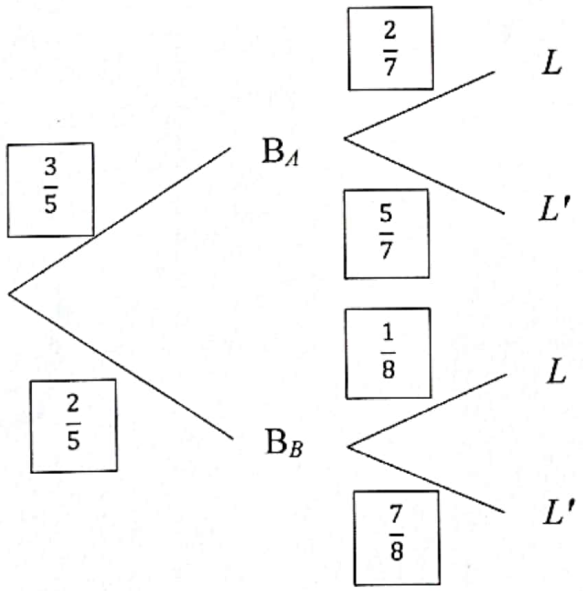
		(875 , 26.25)	1m
	(b)	(i) $\frac{19+18+15+14+17+16+13}{7}$ 16	1m 1m
		(ii) $\frac{19^2+18^2+15^2+14^2+17^2+16^2+13^2}{7} - 16^2$ 4	2m 1m
		(iii) New variance = 16 New standard deviation = 4	1m 1m
17	(a)	(i) 5 minutes	1m
		(ii) 32 km	1m
		(iii) $\frac{32-0}{m-20} = \frac{55-0}{35-20}$ $m = 28.73$ $\frac{55-32}{\left(\frac{45-28.73}{60}\right)}$ 84.82 kmh^{-1}	1m 1m 1m 1m
	(b)	(i)  Note : $B_A = \frac{3}{5}$ and $Bas_B = \frac{2}{5}$ award K1 $B_A L = \frac{2}{7}$ and $B_A L' = \frac{5}{7}$ award K1 $B_B L = \frac{1}{8}$ and $B_B L' = \frac{7}{8}$ award K1	3m

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		(ii) $\frac{3}{5} \times \frac{2}{7}$	1m
		$\frac{6}{35}$	1m
		(iii) (a) $\left(\frac{3}{5} \times \frac{2}{7}\right) + \left(\frac{2}{5} \times \frac{1}{8}\right)$	1m
		$\frac{31}{140}$	1m
		(b) $1 - \frac{31}{140}$ <u>or</u> $\left(\frac{3}{5} \times \frac{5}{7}\right) + \left(\frac{2}{5} \times \frac{7}{8}\right)$	1m
		$\frac{109}{140}$	1m

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